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Wildlife Services Program Highlights

Fiscal Year 2000

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INTRODUCTION

Federal leadership for managing wildlife damage to America's agricultural, industrial, and natural resources is centralized in the U.S. Department of Agriculture's (USDA) Animal and Plant Health Inspection Service (APHIS). APHIS' Wildlife Services (WS) program works with State and other Federal agencies, branches of the military, and the public to minimize negative impacts caused by wildlife on crops and livestock, human health and safety, property, and natural resources including threatened and endangered (T&E) wildlife and other native fauna and flora. This report highlights the accomplishments of WS during fiscal year (FY) 2000. Making this report available is one way WS is working to keep the public and our customers better informed about the many diverse activities conducted by WS. Although WS research activities are highlighted in this report, you are encouraged to request a copy of the National Wildlife Research Center (NWRC) Highlights Report, Fiscal Year 2000 (USDA Miscellaneous Publication 1568) to learn more about our research activities. Write to USDA–APHIS–NWRC, 4101 LaPorte Avenue, Fort Collins, CO 80521–2154. For details about the overall WS program, please write to:
USDA–APHIS–WS
Operational Support Staff
4700 River Road, Unit 87
Riverdale, MD 20737–1234

You may also visit the WS homepage at www.aphis.usda.gov/ws on the World Wide Web.

PROGRAM HIGHLIGHTS

Program Development Activities

During FY 2000, total funding received by WS from cooperators increased by approximately $3.8 million. The FY Federal appropriation included $1.5 million for rabies control, $500,000 for avian reproductive inhibitor research, $400,000 to continue the brown tree snake (BTS) program in Guam, $300,000 to establish a State office in Hawaii, $250,000 for coyote and wolf control in Montana, $200,000 to protect aquaculture in the Southern States, and $100,000 each for managing coyote damage in West Virginia and satellite telemetry studies on double-crested cormorants in Alabama, Arkansas, Louisiana, and Mississippi.

In response to increasing demands for wildlife damage management services all across the country, WS programs have grown and diversified at a rapid rate through cooperative funding. This growth in cooperative funding helps make up for the fact that Federal funding has not kept up with increased demand for wildlife damage assistance. For example, WS assistance in managing wildlife hazards to aviation at civil and military airports saw a sharp increase in FY 2000 with no appreciable increase in Federal support dollars. See the section on the Government Performance and Results Act for a summary of these activities.

WS expanded services in Nevada using new cooperative funding to protect pronghorn antelope, sage grouse, and sharp-tailed grouse from predation. Cooperative funds in the amount of $100,000 were used to establish a full-time wildlife biologist position in Nevada and provide support to manage threats to these species of concern from coyotes, badgers, and ravens. WS also surveyed mountain lion populations in potential bighorn sheep relocation sites in Nevada.

After several years of level funding, the allocation to the cooperative WS program in California increased substantially in FY 2000. This increase of $1,213,935 was provided in recognition of the increase in wildlife damage to agriculture being experienced throughout the State as well as the alarming rate of increase in the number of public safety incidents involving mountain lions, black bears, and coyotes.

Overall, WS experienced an 11.75-percent increase in total cooperative funding from FY 1999 to FY 2000.

During FY 2000, the WS Eastern Regional Office was relocated to Raleigh, NC, and consolidated with the offices of six other APHIS programs into one hub. This was a very complex and time-consuming undertaking for WS and the agency. The collocated regional offices will share administrative resources to reduce program overhead expenses.

Government Performance and Results Act

The Government Performance and Results Act (GPRA), passed by Congress in 1993, requires Federal agencies to develop (1) a strategic plan identifying the vision and mission of the agency along with general goals and objectives, (2) an annual performance plan identifying specific programmatic goals and quantitative targets that support the strategic plan, and (3) an annual performance report of the agency's accomplishments, to be distributed to Congress.

Congress will use this information when considering Federal budget allocations and other resource requests. This information will also help program managers monitor and track data, refine program policies, and achieve more through greater efficiency.

The 2000 APHIS Strategic Plan consists of six broad goals aimed at protecting American agriculture. These goals focus on programs and activities designed to (1) prevent foreign animal and plant pests and diseases from entering this country; (2) monitor those pests and diseases that have entered the country; (3) manage certain plant and animal pests and diseases and wildlife damage; (4) protect animal welfare; (5) develop new scientific tools, methods, products, or other technologies to help the agency in carrying out these activities; and (6) serve the public effectively and efficiently. In total, APHIS set 50 targets and measured its performance against them.

GPRA has provided WS an opportunity to pay greater attention to the impact it is having on the variety of resources it protects. In FY 2000, WS program activities are reflected in goals 3 and 5 of the 2000 APHIS Strategic Plan. Under goal 3, WS set targets and measured itself on five criteria:

- Its ability to increase air passenger safety by reducing the risk of aircraft striking wildlife;
- Its ability to protect human health and safety by reducing the prevalence of canine rabies in those portions of Texas where WS provided oral vaccination of wild canids;
- Its ability to protect property, natural resources, and crops from damage caused by beaver;
- Its ability to protect T&E species; and
- Its ability to prevent the establishment of the BTS on the Hawaiian Islands.

Under goal 5, WS measured its performance by measuring the number of new or improved wildlife control methods tested by NWRC.

For the five measures summarized below, WS met or exceeded its established targets for five of the six measures (indicators). Here is a brief summary of WS program results for these areas.

Air Passenger Safety—For FY 2000, WS efforts to reduce wildlife hazards at airports had a significant impact. For just over half of the projects where WS personnel could measure the results of their work, the risks for aircraft striking wildlife were reduced by an estimated 70 percent. This is an impressive result, given that the program saw a significant expansion of its airport activities since FY 1999. In 2000, the WS program worked at more than 418 airports, which represents a 15-percent increase from the previous year (up from 363 airports). This work, conducted in 48 States, Guam, and Puerto Rico, included both direct hazard-management assistance as well as technical assistance and training. This increased workload has a direct impact on performance results, given that establishing accurate baseline wildlife strike data at airports takes several years and involves a complex measuring scheme.

Rabies Control Work—In FY 2000, the WS program continued to focus its measurement of rabies work on the oral rabies vaccination program in south Texas. The objective of that program is to eliminate the canine strain of rabies in a barrier zone. Results for 2000 show there were no reported cases of canine variant of the rabies virus. This represents a 100-percent reduction from the 166 cases reported in 1994, the year before the program began. From 1995 to 2000, oral rabies vaccination programs in this area have vaccinated 75 to 90 percent of coyotes, based on sampling efforts involving WS. Because of this success, baiting will continue in south Texas in 2001 but at a reduced level. WS officials will contiue to meet with their Mexican counterparts to explore better means of surveillance along the border.

Protecting Property, Crops, and Natural Resources From Beaver Damage—For years WS employees have collected data on the actual beaver damage reported by private individuals and State agencies. However, data that measured the further or additional damage that was prevented by WS employees' work have not been collected, historically. Nineteen ninety-nine was the first year when the WS program sought to quantify how much additional damage it prevented to a variety of resources, including roads, bridges, water control structures, timber, crops, and other aquatic species. For FY 2000, 15 States that conduct beaver damage-management activities reported how much additional damage they believed they had prevented from occurring, using very conservative models to calculate these figures. These models estimate that they prevented an additional $27 million in beaver damage. If less conservative models had been used, these figures could be two to three times higher.

Protecting T&E Species—The WS program continued to play a significant role in the protection and recovery of many federally listed T&E species. WS conducted 126 cooperative projects in 31 States and Puerto Rico that included 142 listed animal and plant species. The program set a target for itself to protect 90 percent of these species for 2000. This meant that 90 percent of the localized populations of the targeted (listed) species would increase after WS intervention or, in some cases, be maintained. WS exceeded this goal for 2000 and had an actual result of 93 percent (117 out of 126 projects) where the local target population increased or was maintained.

BTS Damage—Since 1993, WS has conducted a BTS damage-management program on Guam in cooperation and partnership with several Federal and State government agencies. Given that the snake has already eliminated 9 of 12 species of forest birds on Guam and killed most of the terrestrial vertebrates, 1 key goal of the program is to prevent the snake's introduction to other Pacific islands. Therefore, the program conducts BTS interdiction at Guam's commercial and military exit ports. WS is also the lead agency for investigating reported BTS sightings in Hawaii.

In 2000, no BTSs were reported in Hawaii. While this information does not provide scientific proof of the success of snake control on Guam, it definitely represents a reduction in the number of snake arrivals in locations receiving cargo traffic from Guam. In the 10 years prior to WS involvement in the program, seven snakes associated with incoming traffic from Guam were discovered on the island of Oahu, Hawaii.

Developing Wildlife Damage Management Methods—NWRC is the only research center in the world exclusively dedicated to developing biologically sound, socially acceptable methods of reducing or eliminating wildlife damage. Many of these methods focus on nonlethal and integrated management strategies. NWRC carries out this research by conducting multiyear, multidisciplinary projects that generally last 3 to 5 years. Each project leader submits an annual progress report containing a list of studies undertaken and research highlights. These reports are reviewed by multidisciplinary teams for methods that demonstrate innovation and promise in resolving human–wildlife conflicts. In FY 2000, NWRC met its goal to develop 18 new or improved methods—1 for each project.

For more detailed information about these methods, please refer to the National Wildlife Research Center Highlights Report Fiscal Year 2000 (Miscellaneous Publication No. 1568) and the remainder of this report.

Next Steps in the GPRA Process—For 2001, the WS program intends to continue measuring and sometimes refining its program efforts to achieve good results. While measuring some program efforts is complex and subjective, the program recognizes the value of the measurement effort. Refining these measures is a natural outcome of this evaluative process, and it is expected that there will be some evolution of current measures over time.

The program also hopes to expand its measurement efforts to new areas. One area currently identified is the area of rabies control for the entire United States. The WS program recognizes its role in helping control all wildlife rabies strains in this country. Unfortunately, raccoon rabies in the Northeastern United States is on the rise and becoming a greater concern to public health and agricultural officials. The WS program has already played a key role in applying control strategies and protocols through field trials of a new oral vaccination program for the raccoon strain of the disease.

The overall goal of this new oral vaccination program is to establish an immune barrier for raccoon rabies in the Eastern United States. Currently, this program is underway in Ohio, New York, and Vermont and is using additional monies to expand into West Virginia. Eventually, it is hoped that the barrier will run from the eastern Canadian border in the North to the gulf of Mexico in the South. An additional measure will be reported for the WS program in 2001. It will read

"Number of raccoon variant of rabies cases west of the current vaccination zone in northeastern Ohio."

National Environmental Policy Act

WS State programs use the National Environmental Policy Act (NEPA) process as a planning and project management tool. The national WS program operates under a programwide environmental impact statement, the "Animal Damage Control Program Final Environmental Impact Statement" completed in 1994 and revised in 1997, and routinely develops environmental assessments to analyze the potential impacts of proposed actions and to provide the best environmental information available for planning and decisionmaking. In 2000, WS developed 25 environmental assessments for proposed WS wildlife damage-management activities throughout the country. A national staff of six employees is dedicated to NEPA compliance.

Pesticide Certification Program

To assure that WS personnel are well trained and appropriately certified to use a wide range of tools and techniques, WS is developing a national pesticide certification and training program. A draft plan has been developed for this program and has been submitted for review within APHIS as part of the "Federal Plan for the Certification of Applicators of Restricted-Use Pesticides USDA–APHIS." The program will operate in conjunction with existing State pesticide certification programs and requirements. In order to coordinate with the States, WS has initiated discussion with State pesticide officials to ensure compliance of the WS program with State regulations and to facilitate State support of the WS program. The national WS pesticide certification and training program will ensure that WS employees are trained specifically in the use of vertebrate pesticides. The target for implementing the program is FY 2003.

Invasive Species Control

WS conducted a number of direct and technical assistance projects in FY 2000 to help control damage and threats to human health and safety and impacts to natural resources caused by invasive or nonnative wildlife. The most significant of these is the WS' BTS program on the island of Guam.

The BTS is a major threat to wildlife diversity in the Pacific region and in the United States. It took this snake only 50 years to eliminate three-quarters of the species of forest birds on Guam since its accidental introduction there. Most of the island's terrestrial vertebrates have also been killed by the snake. Many children have been bitten and numerous pets killed by the mildly venomous snakes. More than a thousand electric power outages from shortcircuits caused by snakes have occurred, and Guam's agricultural interests—primarily poultry—have been severely affected by this species. The BTS is also an enormous impediment to outbound cargo and U.S. military operations in the region because of the potential for accidentally moving this invasive pest to other Pacific islands and the U.S. mainland when it hides in cargo or in surface vehicles and aircraft.

Since 1993, WS has conducted a BTS damage management program on Guam in cooperation and partnership with several Federal and State agencies. The focus of this program is to control BTS damage on Guam and prevent the snake's introduction to other Pacific islands and the U.S. mainland. Wildlife specialists make extensive use of snake traps and canine detection teams to accomplish their mission. Specialists also manage the snake's prey base, including rats and nonnative birds, to establish snake-free zones around civilian and military airports and Guam's shipping ports to reduce the attractiveness of these areas to the snakes.

In FY 2000, WS received $1,751,622 in cooperative funding for BTS work, including $1 million to help fund the BTS program on 11 State and Federal airport facilities in Guam and Hawaii. WS expended $115,364 in support of the BTS program in Guam.

Measurable benefits resulting from direct management and methods development by WS include

- An established islandwide line of defense on Guam;
- Increased public and media understanding of the problem and support for management strategies to reduce BTS infestation in high-risk areas. This outreach initiative includes two BTS training videos and an information poster and wallet-sized cards;
- Identification and implementation of a chemical toxicant and registration of a new cargo fumigant;
- Identification and evaluation of potential attractants to replace live mice in operational trapping.

In addition to the BTS work in Guam, WS provides training and snake-control supplies to emergency snake-control teams in Hawaii and the Commonwealth of the Northern Mariana Islands and on request provides personnel to monitor Department of Defense (DoD) training sites on Saipan and Tinian during DoD exercises. In cooperation with other Government agencies, WS is the lead agency for investigating reported BTS sightings in Hawaii.

Two species of neotropical tree frogs, the Coqui frog and the greenhouse frog, were introduced through horticultural trade to the island of Hawaii, perhaps as many as 13 years ago. Since 1997, frog infestations within the State have rapidly spread, both accidentally and intentionally, and the populations of individual frog colonies have grown rapidly, too. These frogs have become increasingly widespread and abundant on the islands of Maui and Hawaii. Given the current population irruptions of these frogs in Hawaii, similar densities could be reached or exceeded if frogs become established in native ecosys-

tems. These frogs may be a potential vector for plant pathogens or nematodes in certified nurseries and could damage native birds and invertebrates through competition and predation. Adding to the problem is the fact that no known control techniques are available to contain the expansion of this frog invasion.

NWRC scientists are collaborating with researchers at other Government agencies to develop traps and chemical control techniques for introduced tree frogs. Initial laboratory chemical screening tests has shown that caffeine might be developed as an effective treatment for localized control of these frogs. NWRC scientists and their colleagues are continuing to examine the potential for developing a caffeine formulation or other control techniques to help Hawaii State agencies and the horticultural industry halt the spread and minimize the impacts of these invasive species.

WS also conducted work in a number of States to reduce damage caused by other invasive or nonnative species, including nutria and red fox; starlings and English sparrows; and feral pigeons, swine, goats, cats, and dogs.

Helping Small Farms

Many thousands of the Nation's small farm and property owners have received assistance from the WS program throughout its long history of supporting American agriculture. Today's active WS program is a leader in USDA's commitment to help small farm interests. Small farms, many struggling under a nationwide small farm crisis, depend on the vital wildlife damage-management services WS provides to protect their livelihood. By providing assistance through cooperative agreements, WS helps minimize the negative impacts wildlife cause on farm crops, property, and natural resources.

As defined by the National Commission on Small Farms, "small farms" are those that generate less than $250,000 worth of gross annual receipts. Based on this information and on data provided by USDA's National Agricultural Statistics Service (NASS), farms with $250,000 or more in gross annual receipts are generally larger than a thousand acres. WS used this definition to estimate that in the Western States, about three-quarters of WS' FY 2000 cooperative agreements were with farms, ranches, and other private entities classified as small farms. In the Eastern States, WS activities are more varied, and agreements with agricultural producers make up a smaller proportion of the work accomplished than in the West. NASS data show it is unlikely that the mean average farm size in any Eastern State is greater than 1,100 acres. Therefore, most if not all of WS agreements with farmers and ranchers in the East are likely to be with small farms and ranches.

Food Donation

WS donates wild game taken during field activities to food banks and charitable organizations to help feed the hungry after the game is appropriately inspected and processed. In FY 2000, WS contributed 43,468 pounds of edible meat, which included 40,701 pounds of venison, to food banks. Donations were made to an orphanage, two Native American organizations, the Salvation Army, Hunters for the Hungry, Share the Harvest (MO), Second Harvest Food Bank (GA), Christian Women's Center (GA), Greater Chicago Food Depository, Bethlehem Center Food Bank (IL), Low Country Food Bank (SC), and Carriage Town Mission (MI).

In Wisconsin, WS assisted in implementing a statewide venison donation program. This inaugural program resulted in the donation of 330,000 pounds of venison from 6,700 deer to charities across the State. WS coordinated the program with meat processors, charitable organizations, hunters' groups, and community service organizations to develop interest and participation. WS assisted in the development of a statewide public relations plan that included producing brochures and posters, news releases, and radio and television public service announcements. A total of 200,000 brochures and 4,000 posters promoting the program were distributed.

Preparing for the Year 2001

To prepare for potential computer problems tied to the "Year 2000" (Y2K) rollover, all WS offices ensured that their electronic equipment and facilities were Y2K compliant prior to December 1999. Equipment determined not to be Y2K compliant was replaced so that WS customers would experience no disruption of services at the New Year. The Management Information System (MIS), WS' national computer reporting system, also underwent a significant conversion to ensure continued operation and to prepare for the upcoming changeover to a new, third-generation reporting system, MIS 2000. Furthermore, each WS office created a business continuity plan for the possibility of any Y2K-related failures in the office. The transition on January 1, 2000, occurred without Y2K-related problems or interruptions in service from WS.

Communication and Outreach

In recognition of the importance of communications, WS coordinated with the APHIS Legislative and Public Affairs (LPA) office in FY 2000 to hire a full-time public affairs specialist to provide support to WS. In addition, the APHIS Policy and Program Development (PPD) staff assisted WS in assessing its communications efforts as part of the strategic planning process for the program. PPD surveyed the WS State directors, WS research field station leaders, and members of the National Wildlife Services Advisory Committee to better understand how communications can be strengthened both within and outside of the program. Throughout this period, WS, LPA, and PPD worked to identify strengths and weaknesses in communications and develop communication strategies to fit within the overall WS strategic plan. As a result, WS is better able to coordinate and respond to diverse and sometimes conflicting social issues that involve special interest groups, industry, local and State governments, and local, State, national and international media regarding wildlife damage management.

In the area of media relations, LPA supported WS in a number of communication projects focused on protecting agricultural resources. For example, LPA represented WS to the news media regarding a research study on blackbird depredation on sunflowers in North and South Dakota. This project received national and international attention through animal rights groups, the sunflower industry, and the media, including the Associated Press (AP), the New York Times, Washington Post, National Audubon Society Magazine, and the San Francisco Chronicle.

Another communication project during FY 2000 focused on endangered species protection in conjunction with the protection of agricultural resources. LPA worked with WS to coordinate and release information regarding gray wolf reintroduction and livestock protection efforts in Montana, Wyoming, New Mexico, Idaho, and Minnesota. This work received local, State, national, and international attention through animal rights groups, the sheep industry, and media sources including Cable News Network (CNN), AP, the British Broadcasting Corporation (BBC), and the National Audubon Society Magazine.

Other program areas that received widespread media attention were health and human safety threats caused by wildlife and the protection of livestock from coyote predation. These programs also attracted national and international attention from animal rights groups and the sheep industry, as well as from NBC Dateline, AP, the BBC, the Washington Post, USA Today, and various local print media.

A major accomplishment in communications was a public information initiative to enunciate how WS operations and research programs protect natural resources, including wildlife, agricultural crops, aquaculture, and property. The project highlighted the impact cormorant depredation has on the aquaculture industry. In this proactive initiative, LPA provided information to the public through the mass media (broadcast and print) on WS research and operations in cooperation with numerous local, State, and Federal agencies and private industry to seek answers through about the overabundance of cormorants and their effect on the catfish industry in the South and habitat destruction caused by cormorants in Northern States. LPA coordinated with the USDA Office of Communication to produce a video news release that was provided by the U.S. Farm Report to 200 media outlets nationwide. In addition, the AP, CNN, and the Washington Post released information about cormorant impacts on aquaculture. The story was also featured in the Department's and APHIS' employee newsletters (USDA News and Inside APHIS, respectively).

A special public affairs project was the promotion of cooperative oral rabies vaccination programs in Texas, Ohio, New York, and Vermont. WS ensured that LPA attended and made presentations at national meetings and developed public affairs strategies to support a national rabies initiative package. Furthermore, WS and LPA worked with the USDA Office of Communications to release an oral rabies vaccination program video news release that was provided by the U.S. Farm Report to 200 American media outlets.

WS biologists were involved in education at numerous colleges and universities, teaching classes or entire courses in wildlife damage management. This activity provides valuable information and contacts with students, most of whom receive very little information about wildlife damage-management issues. Full wildlife damage-management courses were taught at Mississippi State University, Rutgers University, and the State University of New York. Graduate and undergraduate classes were taught at Auburn University, Clemson University, Grambling State University, Lincoln University, Louisiana State University, Louisiana Tech, North Carolina State University, Purdue University, Southern Illinois University, Tennessee Tech, University of Florida, University of Georgia, University of New Hampshire, University of Tennessee, University of Vermont, University of Wisconsin, and West Virginia University. These lectures were well received by both students and faculty members and have been very successful in educating future wildlife management biologists in the importance of addressing wildlife–human conflicts in a professional and responsible manner.

Again in 2000, WS sponsored a display booth at the Experimental Aircraft Association's annual fly-in convention in Oshkosh, WI. The WS booth focused visitors' attention on aviation hazards associated with wildlife at airports. WS employees from both WS regions staffed the booth, answered questions, and provided useful information to visitors throughout the 7-day event. More than 800,000 people attended the fly-in, and 100,000 of them visited the Federal Pavilion, where the WS booth was located.

Living With Wildlife—The WS public outreach campaign, "Living With Wildlife," is designed to educate the general public—especially young people—about the importance of balancing the needs of wildlife with the needs of people. The campaign advocates the responsible management of conflicts between wildlife and people and emphasizes the leadership role of WS in finding environmentally safe and socially acceptable solutions to wildlife problems.

The Living With Wildlife campaign shifted slightly in its outreach strategy in FY 2000 from developing and providing student educational materials to schools to working with educators to implement a nationwide teacher inservice training program about the science of wildlife damage management. LPA worked with WS to develop wildlife damage-management teacher-education materials to meet curriculum standards in science, social sciences, mathematics, and history in school systems nationwide. A teacher's guide and scenarios about livestock protection and aviation hazards caused by wildlife at airports were developed and incorporated into teacher inservice training.

Research Information Exchange—NWRC hosted the "Human Conflicts with Wildlife: Economic Considerations Symposium" August 1–3, 2000, in Fort Collins, CO. Twenty-five invited speakers from the United States, New Zealand, Australia, Germany, and the United Kingdom representing a cross section of the most knowledgeable authorities in the world on wildlife–human conflicts and the associated costs addressed more than 100 participants. Symposium topics included methods for quantifying resource damage caused by wildlife and case studies of damage caused by wildlife to agricultural commodities, the costs associated with damage caused by wildlife to nonagricultural activities of humans, the costs and implementation of management programs to control the spread of wildlife-related diseases to humans and domestic livestock, optimization models as a method to allocate research and operational resources in the development of management plans, and the impact of wildlife on other wildlife as it relates to environmental management practices. This is the third such international symposium hosted by NWRC. The previous two focused on repellants in wildlife management (1993) and contraception in wildlife management (1995).

WS, The Humane Society of the United States (HSUS), and the Jack Berryman Institute cosponsored a symposium entitled "Nonlethal Approaches to Wildlife Damage Management: Promise, Potential, Reality" at the national meeting of The Wildlife Society in Nashville, TN, on September 15, 2000. There were 14 presentations by leading scientists (including 3 from NWRC), administrators, and practitioners in the field of wildlife damage management. Issues discussed included the efficacy and humaneness of relocating nuisance wildlife to resolve conflicts, the effectiveness of various exclusion devices, situations where lethal control is justified, and the potential for reproductive inhibitors. The symposium was successful in promoting constructive dialogue that should lead to greater cooperation among the various governmental and private groups dealing with the growing diversity of wildlife–human conflicts.

NWRC biologists participated in the Seventh Western Black Bear Workshop in Coos Bay, OR, May 2–5, 2000. NWRC participants gave three oral presentations and also presented a poster, all dealing with aspects of black bear damage during reforestation and potential ways of reducing damage. The workshop was attended by about 150 people from 17 States and Canadian Provinces. A wide array of topics was covered, including research techniques, basic biology and ecology, population monitoring, human–bear conflicts, bear conservation and reintroductions, legal and illegal harvesting of bears, and the effects of forestry and development on bear populations. A proceedings of the workshop will be published in 2001.

WS research and operational personnel participated in a feral swine planning meeting between APHIS' Veterinary Services and WS in Raleigh, NC, May 9–10, 2000. The objective of the meeting was to develop a common agency strategy aimed at reducing the risk of disease transmission (such as swine brucellosis and pseudorabies) between feral swine and domestic livestock. The group discussed research needs, surveillance, diagnostics, and control methodologies such as barriers, fertility control, vaccination, population reduction, and industry regulation. Feral swine are becoming more widespread in North America and are considered by some to be a pest or threat while others consider them a valuable recreational and economic resource. As a result, any feral-swine management strategy must consider the benefits of the species as well as the risks posed by having a disease reservoir in feral swine populations. The meeting participants will develop a white paper that will present issues and concepts along with proposed action items and budgetary needs for the initiative.

Bird Strike Committee–USA Conferences—Every year, billions of dollars are wasted and lives are endangered worldwide when birds and other wildlife damage aircraft. Bird Strike Committee–USA (BSC–USA) was formed to meet this challenge by providing a forum for increasing communication and professionalism among the diverse groups addressing wildlife issues at airports. Since the group's inception in 1991, WS wildlife biologists have chaired BSC–USA.

The 2d annual joint meeting of BSC–USA and BSC–Canada was held August 8–10, 2000. The conference was organized by biologists from NWRC's Sandusky, OH, field station in cooperation with the airline industry and WS personnel from Minnesota. In all, 37 technical papers and posters were presented to a record 363 participants from 15 countries on topics related to reducing wildlife collisions with aircraft. About 70 WS biologists attended the meeting. Highlights of the conference included presentations by representatives from the National Transportation Safety Board (NTSB) and Federal Aviation Administration (FAA) regarding NTSB recommendations to reduce wildlife hazards at airports. Another highlight was the demonstration of various techniques for managing wildlife hazards at airports during an all-day field trip to two airports. Fifteen companies exhibited their wildlife management products or services. The conference was highly successful in promoting communication and professionalism among the many agencies and organizations involved with wildlife issues at airports.

Investing in Our Employees

The WS Leadership Excellence Program II was initiated in September 1999. The intent of the program is to build on leadership potential and enhance leadership skills in mid-level employees. Nineteen employees were selected to participate in the program, which consists of four weeklong training workshops plus a variety of individualized developmental assignments and activities. Participants will complete an Action Learning Project on a current WS leadership issue and a 30- to 60-day developmental assignment to strengthen and use targeted leadership skills before graduating in May 2001.

In 1996, WS initiated a training program to prepare its biologists to work effectively in airport environments. Training courses are conducted annually and focus on wildlife survey and management techniques to minimize wildlife hazards to airport safety and on working effectively in unfamiliar and often complex organizational environments. WS has trained 104 personnel to conduct wildlife hazard-management work at airports. Of these, 89 are biologists certified to supervise airport projects and prepare airport wildlife-hazard assessments and management plans.

WS continued its program to train and certify WS explosives specialists for beaver dam removal using binary explosives. These are a safe, cost-effective tool for removing problem beaver dams that cause flooding of agricultural crops, timber, and property, including public roads. This state-of-the-art program is recognized by the commercial explosives industry as one of the premier explosives training programs in the United States. WS has 86 certified explosives specialists operating in 20 States to assist State and local governments and private landowners in managing beaver damage.

In cooperation with NWRC's Olympia, WA, field station, the WS program in Mississippi supported a graduate student position in wildlife management at Mississippi State University. The student, an NWRC employee recently transferred from WS operations, is investigating a new beaver census technique that will provide valuable data for NWRC's ongoing mammal research program.

Research Activities

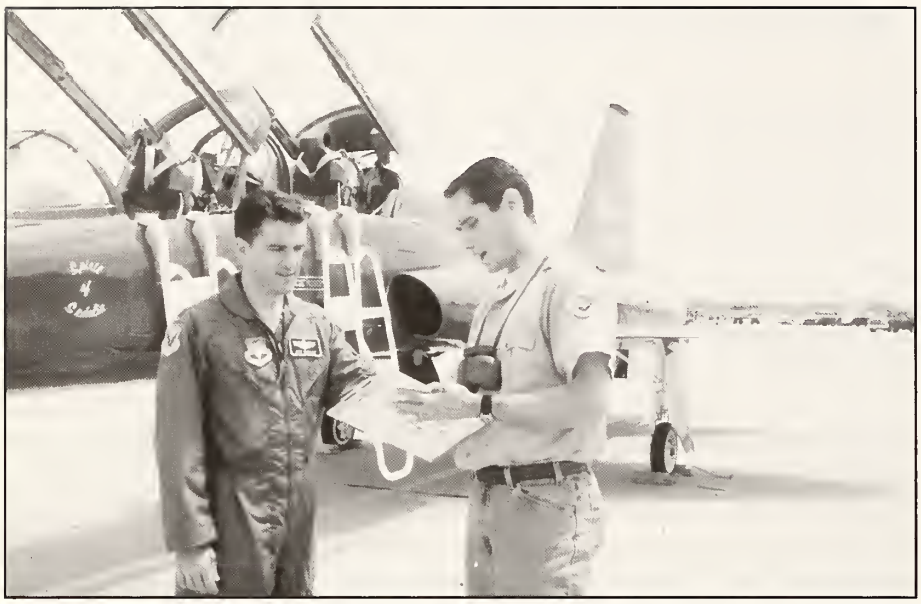
Through an agreement with the General Services Administration (GSA) and a $3.5-million congressional construction appropriation received in FY 1999, NWRC is continuing construction of its state-of-the-art wildlife management research facility and national headquarters on the Foothills Campus of Colorado State University in Fort Collins, CO. NWRC currently occupies a Government-owned 25,000-ft^2 indoor Animal Research Building and a GSA-leased 82,000-ft^2 Wildlife Science Building on the 43-acre site. During FY 2000, all construction documents were completed and bid negotiations were begun to contract a private developer to build an outdoor animal research complex and associated support structures. The developer will lease these structures to NWRC when completed in FY 2002. Design work was also completed on a new support wing to be added to the existing indoor Animal Research Building, which has been funded by Congress and will be ready for occupancy in FY 2002. Approximately 25 percent of the NWRC master plan remains to be funded, designed, and constructed.

NWRC's $10,357,000 appropriated budget in FY 2000 was supported by an additional $1,776,000 through funding provided by as many as 50 cooperative agreements.

In 2000, NWRC addressed the research needs of the WS program and its customers through 19 multiyear research projects focusing on methods-development work, including laser devices for dispersing birds, satellite telemetry, reproductive inhibitors and immunocontraceptives, innovative live-capture devices and methods, and maintenance of minor-use chemical pesticides, repellants, and attractants. The projects involved bird damage to crops and aquaculture; mammal damage to timber, rangeland, and livestock; and wildlife threats to aviation safety and T&E species.

NWRC's annual performance report to Congress for FY 2000 reported its accomplishments in meeting its goal under the Government Performance and Results Act. The goal was to test a variety of new or improved wildlife damage management methods in an effort to develop useful, appropriate methods for solving wildlife damage problems. Annual progress reports submitted by project managers list studies undertaken and highlight advances made by the scientists. For FY 2000, NWRC reported the development of 18 new or improved methods to manage wildlife damage. The following are examples of work by NWRC in FY 2000.

National Trap Testing Program—NWRC continued to coordinate a national trap testing program to improve animal welfare in cooperation with international and State wildlife agencies to meet U.S. commitments to the European Union. Development of performance data on traps in operational use will assist States in improving trapper education programs and in the preparation of best management practice guidelines. The program involves 31 State wildlife agencies and focuses on high-priority species captured by State-licensed private trappers. These State agencies collaborate with WS, the U.S. Fish and Wildlife Service (FWS), and private trapper organizations in testing 37 commercially available restraining systems for 14 species of furbearers.



Airport Safety—NWRC has conducted research on reducing wildlife strikes to aircraft since 1991. During FY 2000, NWRC's Sandusky field station continued an active research program focusing on aviation hazards caused by birds and mammals. Research is focused on (1) evaluation of habitat management regimes at airports to reduce bird numbers, (2) development and management of the FAA National Wildlife Strike Database, (3) development and evaluation of bird control technologies for airports, and (4) development of manuals and other publications to guide airport operators and biologists in managing wildlife hazards at airports. The partnership formed by WS and FAA to improve aviation safety provides an outstanding model of cooperation and efficiency between Federal agencies.

- Biologists from NWRC's Sandusky field station, with assistance from New York WS personnel and other Federal and State government employees, conducted a "ground-truth" census in June 2000 for a laughing-gull nesting colony in a marsh complex totaling 600 acres in New York. The marsh, on Federal Government property, is adjacent to an airport where gull–aircraft collisions have been a serious problem. Results of the census indicated the colony contained about 2,720 nests, a decline of 65 percent from the 7,600 nests counted in 1990. Management programs by WS at the airport in 1991 through 2000 have reduced laughing gull–aircraft collisions by over 90 percent compared to 1988–90, when the airport averaged over 150 strikes/year. Although the local population of laughing gulls next to the airport has declined as a result of these management actions, the regional population from Virginia to Maine has shown no decrease during the 1990s, based on analysis of North American Breeding Bird Survey data.

This NWRC-developed census technique is a critical component of the gull management program at the airport and has application in other situations where colonial-nesting water birds conflict with human activities.

- As part of a cooperative effort, NWRC scientists summarized all wildlife strikes to civil aircraft in the United States for 1990 through 1999. During this 10-year period, 28,150 wildlife strikes were reported. Birds were involved in 97 percent, mammals (mostly deer) in 2 percent, and reptiles in <1 percent of the strikes. The average cost per year to U.S. civil aviation from these strikes was estimated to be $391 million. Information documenting the hazards of wildlife presence in airport environments is critical for developing wildlife hazard-management plans for airports.

Beaver Damage Research—NWRC scientists and WS wildlife specialists from across the Southeast worked together in 2000 on beaver damage-management research emphasizing the development of methods to address regional management problems. Good progress was made in studies on the efficacy of textural repellants to reduce beaver gnawing of stems and seedlings. Beaver gnawing is often detrimental to tree plantings along streams and can impede the recovery of riparian zones. NWRC scientists investigated whether repellants are feasible tools to reduce this damage. None of the commercial repellants tested prevented beaver from girdling mature trees. However, two repellants demonstrated some efficacy in protecting seedlings and foliage from beaver consumption. A new textural repellant was developed by NWRC scientists and has had favorable results when used operationally by WS specialists.

Aquaculture Research—Investigations of problems caused by birds in the aquaculture industry are the primary focus of the NWRC field station located at Mississippi State University. Here are some examples of projects conducted in 2000.

- A dramatic increase in populations of double-crested cormorants over the last two decades led to increased conflicts with human interests. NWRC scientists initiated two studies to learn more about the movements of cormorants in North America. One study involved attaching 25 satellite transmitters to cormorants in Alabama, Arkansas, Louisiana, and Mississippi that will enable researchers to determine the northward and southward migratory paths of cormorants captured near southern aquaculture facilities. The second study will show the effectiveness of breeding colony control activities in eastern Lake Ontario, NY. These studies will provide critical information that wildlife managers need to minimize the impacts of large cormorant populations on aquaculture and other valuable resources.

- NWRC biologists investigated the foraging behavior of the great blue heron and the phenomenon of disease transmission at aquaculture facilities. Several studies demonstrated that heron foraging at catfish farms was greatest in ponds with diseased fish or where fish were being fed with floating feed. Predation on catfish was directly related to outbreaks of fish disease during the fall months. Therefore, the investigation suggested that producers can reduce losses to herons by dispersing them during the summer months. Dispersal is necessary only when fish are being fed.

- A survey of all baitfish farmers in Arkansas was conducted to determine bird depredation patterns, and the impact of avian predator species was evaluated. Between 83 and 94 percent of wading birds collected on baitfish aquaculture facilities during the study were determined to be immature birds. This fact suggests that nonlethal dispersal of rookeries might deter depredation due to wading birds. Further study has been proposed for field-testing lasers for dispersing wading birds from rookeries to reduce their impacts on the baitfish industry.

New Solutions for Wildlife Problems—NWRC scientists are currently testing a number of new methods for managing wildlife damage to agriculture, property, and natural resources as well as threats to human health and safety.

- Three NWRC studies in FY 2000 were conducted to evaluate the effectiveness of lasers as avian repellants and dispersive agents. Preliminary results from field investigations of low-powered laser devices for dispersing cormorants from night roosts in Mississippi and Alabama catfish-production areas indicate that lasers can be effective in dispersing cormorants from night roosts. A field investigation of laser use for dispersing great blue herons foraging at State-operated fish hatcheries in Oregon demonstrated that herons could easily be moved from hatchery raceways. Further studies are planned to evaluate species-specific responses relative to laser power, beam type, wavelength, and light and field conditions.

- NWRC scientists are cooperating with several organizations to test electronic devices originally developed as prototypes by NWRC scientists in a cooperative effort. A predator-activated Electronic Guard frightening device was developed and placed in an area where wolf predation on calves had occurred. Based on examination of wolf tracks and radio telemetry locations, this initial field study indicated that the device, activated by radio collars on approaching wolves, successfully repelled previously depredating wolves from a calving area. Because of the potential usefulness of this device, two prototype radio collar-activated predator frightening systems have been produced and are currently being used by WS specialists managing wolf conflicts. Current efforts are aimed at lowering cost and improving ease of use of the device by incorporating wireless and miniaturized components.

- In cooperation with many Government agencies and other organizations, NWRC scientists have also initiated work to determine the effectiveness of electronic collars for conditioning wolves not to attack livestock. Based upon previous work indicating the effectiveness of the aversive stimuli produced by the collars for conditioning coyotes, NWRC personnel are testing the concept using captive wolves in Bozeman, MT. Similar cooperative efforts in another Western State are underway to develop prototype systems for automatically attaching radio telemetry collars to large predators. Such systems would allow radio-marking of animals near predation sites without requiring capture and handling. The concept could dramatically increase the use of radio telemetry and aversive-collar applications for large predators.

- Coyote predation on domestic sheep has long been a problem for the sheep industry throughout the Western United States. The provisioning of pups seems to be an important motivational factor for coyote depredation on lambs during the spring months in the Intermountain West. NWRC scientists, working with a Utah State University graduate student, evaluated coyote sterilization as a method of reducing sheep losses to coyote predation on open range in northeastern Utah.

  Coyotes were captured, surgically sterilized by tubal ligation or vasectomy, released, and monitored over 3 years by radio telemetry. Small flocks of sheep (ewes and lambs) were moved periodically through all coyote territories, and sheep kills were monitored through the summer grazing seasons. While sterilization did not eliminate killing behavior, it did significantly reduce coyote predation rates on sheep.

  Four of 9 sterile coyote packs killed a single lamb each, while 7 of 14 reproductively intact packs killed between 1 and 13 lambs. Among packs that killed sheep, intact packs with pups killed six times more sheep than sterile packs. Packs with sterile coyotes maintained pair bonds and territory fidelity similarly to reproductive packs, with no difference in territory size. A sterile coyote pair that is killing fewer lambs and excluding other possible sheep-killing coyotes could provide an effective management tool, provided that practical, economic methods of producing selective sterility can be found.

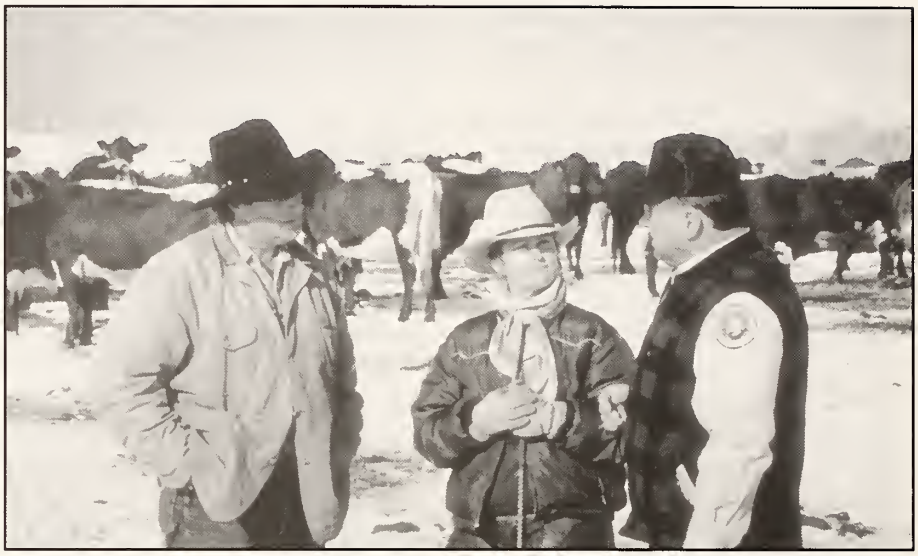
- NWRC is conducting research on an infertility agent in collaboration with a manufacturer of nicarbazin (NCZ). The manufacturer has an FDA-approved use of NCZ in broiler chickens for control of coccidiosis. Large-scale broiler chicken production is not possible without effective control of this parasite. NCZ added to the feed is provided to broilers continuously for 38 days of their 42-day life to control coccidiosis and increase their weight gain. If NCZ is fed to breeder or layer chickens, their eggs, although fertilized, often do not hatch. Other than the reduction in egg hatchability, NCZ has no health effects on birds. It has no known effects on mammals.

  NWRC and the NCZ manufacturer are interested in development of NCZ as an oral fertility-control agent for geese. As a result, NWRC has begun to study the use of this compound to manage overabundant avian species. In a pilot study conducted in 1998, NWRC tested the effect of NCZ on Japanese quail reproduction in a laboratory setting. The study demonstrated that NCZ was effective in limiting the hatchability of eggs in species other than chickens. In 1999, NWRC began testing the compound as an oral reproductive control agent for Canada geese. Researchers found that Canada geese successfully absorbed NCZ into the blood serum, although at a lower rate than found in the chicken. Several other laboratory and field studies also were sufficiently positive to indicate that NCZ is a promising goose infertility candidate.

- APHIS has five Investigational New Animal Drug (INAD) authorizations with FDA that allow interstate transport of the compounds for experimental purposes. Two of the INADs are for the immunocontraceptive materials gonadatrophin-releasing hormone (GnRH) and porcine zona pellucida (PZP). Studies with GnRH- and PZP-vaccinated white-tailed deer have shown both injected vaccines to be effective in reducing fawning rates. Efforts are underway to develop oral vaccine delivery mechanisms to make the techniques more appropriate for field use. During 2000, a new INAD was received to test 20, 25 diazocosterol (Diazacon) as a reproductive inhibitor for wildlife. Recent research with Coturnix quail, rats, and prairie dogs has demonstrated the contraceptive potential of Diazacon. However, further experimentation with the formulation and method of administration is required. Research will continue to determine the feasibility of using Diazacon in seasonally breeding rodents. The remaining two INADs are for the immobilizing agents propiopromazine HCl and alpha-chloralose. Alpha-chloralose continues to be used experimentally for capturing and relocating problem birds in urban settings, such as parks and zoos. Propiopromazine HCl (used in the Tranquilizer Trap Device) is used in conjunction with soft-catch traps and has been effective in minimizing injury to trapped predators throughout the Western United States and to feral dogs in Guam.
- Between 1995 and 1998, NWRC conducted research to identify chemicals (toxicants, fumigants, attractants, and repellants) to control the BTS. Beginning in 1999 on Guam, field tests were initiated on a number of chemicals, including acetaminophen. Acetaminophen was determined to be an effective toxicant on the BTS. In two field trials, preliminary analysis suggested that snake populations in multiple study plots were reduced by 50 percent to 80 percent. During 1999, APHIS obtained a 3-year Emergency Use Registration from EPA to use acetaminophen as a toxicant to control the BTS on the island of Guam. This Emergency Use Permit provides another tool to prevent the spread of the BTS to other Pacific islands. Because of the success of this compound in reducing snake numbers in baited areas, the NWRC staff during 2000 began assembling the data and registration package required by EPA to support a full registration for its continued use in the Guam program.

PROTECTION OF AGRICULTURAL RESOURCES

WS plays a leadership role in cooperative efforts with the States and agriculture producers across the country to protect farm crops, livestock, and aquaculture and forest resources from damage caused by wildlife. Annual depredation losses to selected agriculture commodities in the United States have been documented by NASS. These losses include more than $110 million for corn, blueberries, and sunflower and more than $14 million for farm-raised catfish and trout. Annually, wildlife damage to agriculture in the United States, excluding forest resources, is estimated at between $600 million and $1.6 billion.



Although numerous species of wild animals cause damage to farm crops, birds and deer cause the most damage. Each year, for example, blackbirds severely damage rice in the Southeastern States and sunflower crops in the Dakotas and Minnesota. Scientific surveys show the value of sunflower damage in these three States to be $4 million to $11 million each year. WS personnel provide assistance to farmers through cooperative programs designed to reduce damage to tolerable levels through habitat management, behavioral modification, and population management. In response to producers' requests for technical assistance, WS provides literature and recommendations based on research findings, gives demonstrations or training, and loans specialized equipment to producers.

In some situations, WS conducts direct management assistance through cost-effective, integrated wildlife damage-management programs that use a variety of nonlethal and lethal approaches to minimize damage. When lethal removal is necessary, WS uses the most selective methods available and continues to improve on methods selectivity through research. The number of nontarget animals taken by WS nationwide is typically less than one half of 1 percent of the total number of all animals removed by lethal means.

Predator damage management continues to be an important focus in Western States. All Western States except Hawaii, Alaska, and Kansas have major cooperative livestock-protection programs. Statistics compiled by NASS estimate annual cattle, sheep, and goat losses to predators in the United States at more than $65 million.

WS commissioned NASS to conduct a customer satisfaction survey of livestock producers in 24 States that received direct assistance from WS to manage wildlife predation on livestock at their farms or ranches. WS customers reported losses of cattle, sheep, and goats caused by predators valued at $17.5 million during 1998. Predators accounted for 64 percent of WS customer livestock losses to all causes in 1998, and coyotes were responsible for 58 percent of all predator losses. Almost 75 percent of the 11,777 producers contacted in early 1999 responded to the survey. Overall, more than 89 percent of the respondents were satisfied with the services received from WS. They also gave high marks on WS program effectiveness, with more than 85 percent rating the services received as effective.

WS conducted livestock protection activities in 43 States during FY 2000 in cooperation with private individuals and State, Federal, and local governments. WS cooperators provided 61 percent of the total funding for livestock protection.

In North Dakota, WS responded to 785 occurrences of coyote and fox predation to calves, sheep and lambs, and poultry and documented $145,000 in livestock losses to predators. WS also administered a 50:50 cost-share program that helps provide producers purchase guarding animals and nonlethal wildlife damage-management materials. In FY 2000, 22 of North Dakota's livestock producers purchased 10 guarding dogs, 9 llamas, 2 donkeys, and a propane cannon through the program.

As the eastern timber wolf population continues to increase in Minnesota, Michigan, and Wisconsin, so have requests for assistance with wolf predation. In accordance with the Eastern Timber Wolf Recovery Plan, WS provides damage management assistance to livestock and other resource owners. In FY 1997, WS received 118 requests for assistance involving wolf predation to domestic animals, compared to 157 for FY 1998, representing a 30-percent increase. The number of annual predation assistance requests in calendar year 2000 was 202. The Minnesota wolf population has increased to an estimated 2,450 individuals and expanded to range over half of the State as well as into Wisconsin and Michigan. WS has good support for its professional management of wolf predation in Minnesota. In Wisconsin, WS coordinates with the State to capture and relocate depredating wolves. The Wisconsin wolf population has about 50 packs numbering about 250 animals. The wolf population in the upper peninsula of Michigan is currently estimated at 216. WS recently hired a wolf specialist to respond to requests for assistance in Michigan and assist with gathering data needed to better manage wolf conflicts.

The population of grizzly bears is increasing in the West, particularly in one State where bears are dispersing into livestock grazing areas. To address this growing problem, WS entered into an agreement with the State's game and fish department for WS to respond to requests for assistance with grizzly bear depredation from livestock producers in a four-county area. This cooperative program has been so successful that the game and fish department wants to expand the program into additional problem areas.

Bovine tuberculosis is a concern to agricultural producers in the Great Lakes region. At the request of one State department of agriculture in FY 1998, WS removed a captive deer herd after bovine tuberculosis was confirmed in white-tailed deer on a private ranch. WS worked with the resource owner and State officials to depopulate the infected herd, thereby reducing the disease threat to livestock and other farm animals. During FY 2000, WS conducted a final monitoring survey of the project area and provided a final report to the State Department of Agriculture.

WS continued efforts to protect sunflowers from damage caused by blackbirds in North Dakota and South Dakota. Forty-five million to 70 million blackbirds migrate through the Dakotas each fall, resulting in a $3- to $5-million loss to producers. Damage is often concentrated near cattail marshes, where the birds roost. Since 1991, WS has been treating marshes with a glyphosate-based herbicide to reduce the density of cattails, thereby decreasing their attractiveness to migrating blackbirds. The treatments remain effective for at least 4 or 5 years. In FY 2000, WS treated 111 wetlands covering 2,838 acres of cattails. Sunflower fields as far away as 20 miles from these treated wetlands can benefit from a reduction of blackbird roosting habitat. During FY 2000, WS assisted more than 600 sunflower farmers by treating cattails, baiting sunflower fields, loaning propane cannons, and providing technical assistance.

The Need for and Results of Aquaculture Protection

Aquaculture—the farming of fish, shellfish, and aquatic plants—is a nearly $1 billion industry in the United States. It is the fastest-growing sector of the animal production industry worldwide. Since 1980, aquaculture production in the United States has increased by more than 425 percent and continues to rise. U.S. aquaculture accounts for more than 180,000 jobs and has an economic impact of more than $5.5 billion. This rapidly growing industry faces many challenges, including damage to aquaculture resources caused by wildlife and the spread of disease and parasites. WS' role is to assist the aquaculture industry in managing wildlife depredation to commercial fish resources and helping to minimize wildlife-borne aquatic diseases.

WS continued efforts during FY 2000 to reduce damage caused by fish-eating birds. WS personnel provided technical and/or direct management assistance to fish producers reporting losses in 38 States through cooperative programs to minimize bird depredation on commercial fish stocks. WS has five aquaculture biologists stationed in Ruskin and Blountstown, FL, Stoneville, MS, Greensboro, AL, and Lonoke and Lake Village, AR. These biologists provide assistance and equipment to aquaculture producers, including catfish farmers in Alabama, Arkansas, Florida, and Mississippi, tropical fish farmers in Florida, and baitfish farmers in Arkansas to reduce bird damage to their aquacultural resources. WS also provided assistance to catfish and crawfish farmers in Louisiana and trout farmers in Pennsylvania.

A 1998 NASS survey of producers in the 15 largest catfish-producing States in 1996 revealed that 69 percent of the producers reported some wildlife-caused losses. Overall, the producers lost $11.5 million worth of catfish to wildlife depredation. The losses and damage management expenditures totaled $17 million, or 4 percent of all catfish-generated revenue. The average cost of wildlife-caused loss from all States was $13,700 per farm reporting a loss, and an average of $6,200 per farm was spent to reduce losses. The highest loss rate was in Mississippi. Birds, primarily the double-crested cormorant, were most frequently cited as the cause of losses.

WS again coordinated a cooperative cormorant roost-dispersal program across the primary catfish production region of the Mississippi delta. From November 1999 through early March 2000, several hundred catfish farmers, Federal and State employees, sportsmen, and interested citizens participated in monitoring and dispersing cormorants from 78 night roosting sites located near fish production areas. This nonlethal management strategy developed by WS has been effective in reducing damage and is well accepted by producers. Cormorant populations were reduced in the region by as much as 80 percent.

In February, WS and other Federal and State agencies jointly conducted a cormorant roost census in western Alabama and eastern Mississippi and another in the delta region of western Mississippi and eastern Arkansas. In the midwinter cormorant roost census for the delta, 68,230 cormorants and 78 roosts were counted. A total of 15,310 cormorants and 21 roosting sites were observed in the catfish production area of western Alabama and eastern Mississippi.

The Double-Crested Cormorant Strategic Damage Management Plan was completed by NWRC and provided to WS State directors and the State wildlife agencies for review. The FWS, the flyway councils, and aquaculture industry organizations will also comment on the plan. It summarizes biological data on cormorant populations and their impacts and outlines research needs and strategies for cormorant management. In addition, WS continues to cooperate with other agencies in the development and implementation on an environmental impact statement on the management of double-crested cormorants.

A new wildlife biologist position was established and filled at the University of Florida's Sam Mitchell Aquaculture Research Farm in Blountstown, FL, to assist aquaculture producers in southeastern Alabama, southwestern Georgia, and the panhandle of Florida with fish-eating bird depredation.

PROTECTION OF ENDANGERED SPECIES AND OTHER NATURAL AND CULTURAL RESOURCES

WS continued to play a critical role in the recovery of federally listed T&E species around the country. Program expertise resulted in many organizations' (including other Federal agencies, State and local governments, and even private conservation groups) turning to WS to minimize the impacts of predation and other negative impacts wildlife cause to T&E species. In FY 2000, WS conducted 126 projects for the protection of 143 T&E species in 31 States, Puerto Rico, and the Virgin Islands. As a result, 93 percent of the WS' T&E species' direct protection and recovery-enhancement projects benefited species whose population status either increased or was maintained.

The recovery of gray wolves in western Montana, central Idaho, and Yellowstone National Park is succeeding beyond the expectations of wildlife biologists associated with the project. The number of wolves in the three areas has grown to over 400 animals. WS continues to play a key role in the recovery process by capturing wolves that attack or threaten livestock. Under Federal guidelines, WS employees work on the ground and from aircraft to capture the wolves causing damage. In FY 2000, WS responded to more than 50 incidents of suspected wolf predation on livestock in Idaho alone, where 15 calves and 55 sheep were confirmed killed by wolves.

The reintroduction of the Mexican gray wolf in the Southwestern United States continued with considerable WS involvement. Gray wolves were reintroduced in 2000 into remote areas of the Gila National Forest in southwestern New Mexico. WS continues to support reintroduction efforts by assisting in public outreach programs and in monitoring and capture efforts and responding to human–wolf conflicts.

WS continued its cooperation with various State and Federal agencies to aid in the reintroduction and protection of black-footed ferrets in Utah, Montana, Wyoming, Colorado, Arizona, and South Dakota. WS collected blood samples from carnivores in the areas of ferret reintroduction to help biologists determine the level of risk to ferrets from wildlife diseases, such as plague and distemper. WS wildlife specialists also removed some predators from new ferret release sites to help ferrets become established in prairie dog colonies.

WS personnel from Virginia provided assistance at an overseas military installation by reducing the feral cat population in accordance with Armed Forces Pest Management Board recommendations. The feral cats were preying on endangered lizards, endangered sea turtle hatchlings, and other native wildlife. Because feral cats can transmit many diseases to people and domestic animals, the health of personnel and pets on the base was being adversely affected.

WS continued to assist in Alaska with recovery efforts for the Aleutian Canada goose, a threatened species. Arctic foxes introduced to the region have decimated traditional nesting populations of these geese on the Aleutian Island chain. WS is assisting in successful efforts to remove the fox from key islands. Goose populations are beginning to recover, and they are being considered for down-listing from the endangered species list.

The WS endangered species protection program in Florida was expanded in FY 2000 to encompass certain parts of the Florida peninsula. On a national wildlife refuge on the Atlantic coast where an average of 1,500 sea turtles nest along a 3-mile stretch of beach, WS reduced nest predation by raccoons and armadillos from 34 percent to 19 percent in FY 2000. Sea turtle nest predation in the Florida panhandle was eliminated, from 93 percent of the nests destroyed by raccoons, coyotes, and foxes to 0 percent in FY 2000. In just 1 year, WS lowered the number of sea turtle nests destroyed by raccoons to the second lowest on record. Overall, natural resource agencies and conservation organizations report that sea turtle nesting in the State is at an all-time high and attribute the nesting success to predator damage management. The program's predator damage-management efforts have also expanded the ranges and populations of several species of endangered beach mice in the Florida panhandle.

WS personnel conducted a gull damage-management project for a nonprofit organization on an island near Portland, ME, to allow roseate terns and common terns to reestablish nesting colonies there. In 2000, 10 pairs of roseate terns and 1,129 pairs of common terns nested on the 3-acre island, making it the second-largest tern nesting colony in Maine.

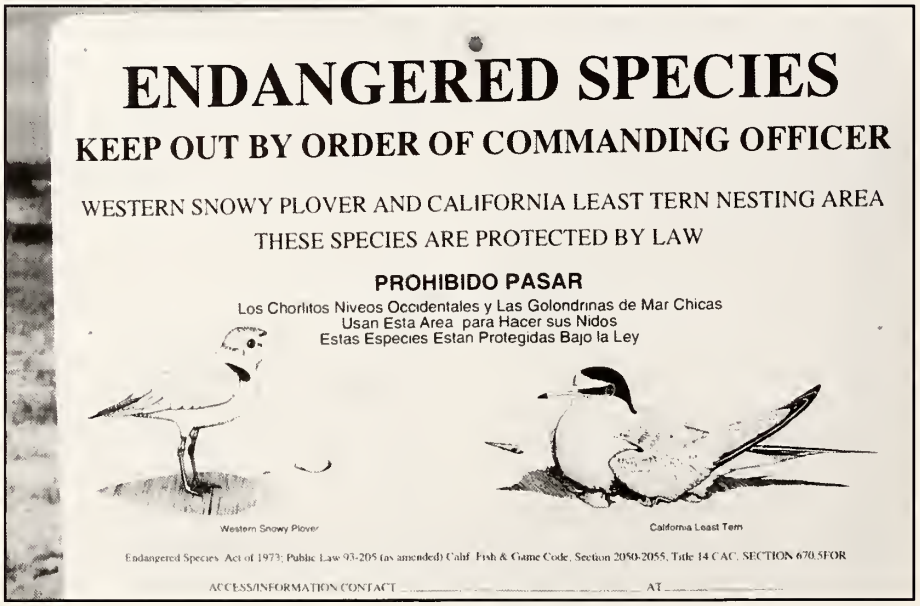
WS worked closely with several entities in Louisiana to increase public awareness about the Louisiana black bear, a federally listed threatened species in Louisiana, Mississippi, and Texas. WS and its partners emphasize the need to publicize the importance of reporting black bear conflicts rather than harming offending bears.

In Puerto Rico, WS personnel conducted population censuses and limited predator damage-management activities and constructed nest boxes for the protection and recovery of the endangered Puerto Rican parrot. The program has reduced exotic mongoose predation of the parrots. Expansion of WS' parrot protection activities are planned for FY 2000.

On the Snake and Columbia Rivers in Washington State, 13 hydroelectric power facilities are the site of WS activities to protect T&E fish species from predation by gulls, cormorants, and the northern pike minnow (squawfish). The work is designed to protect downstream migrating smolt of the endangered sockeye and Chinook salmon and the threatened steelhead trout. Pike minnows are being caught and removed from waters below the reservoir dams. Predatory birds are being excluded or removed from areas where smolt are most vulnerable to avian predators.

Biologists at NWRC's Sandusky field station captured 400 brown-headed cowbirds in April 2000 that were used in the cooperative recovery effort for the endangered Kirtland's warbler in Michigan. The cowbirds trapped in Ohio were taken to Michigan and used as decoys to lure other cowbirds to traps in areas of jack pine forest where warblers nest, thereby reducing the incidence of nest parasitism. The 400 decoy birds resulted in 4,345 cowbirds being captured in Kirtland's warbler nesting habitat during May through July 2000. About 117,000 cowbirds have been removed from the warbler nesting area since the trapping program began in 1972. Since 1972, cowbird parasitism has been reduced from over 50 percent to under 5 percent of nests, and the nesting population of warblers has increased from about 180 to more than 800 pairs. One shortcoming of the trapping program has been that about 55 percent of the birds captured were males (65 percent in 2000). NWRC is designing a study in cooperation with many government agencies to evaluate methods to increase the capture rate for females. NWRC has provided cowbirds for this endangered species project annually since 1980.

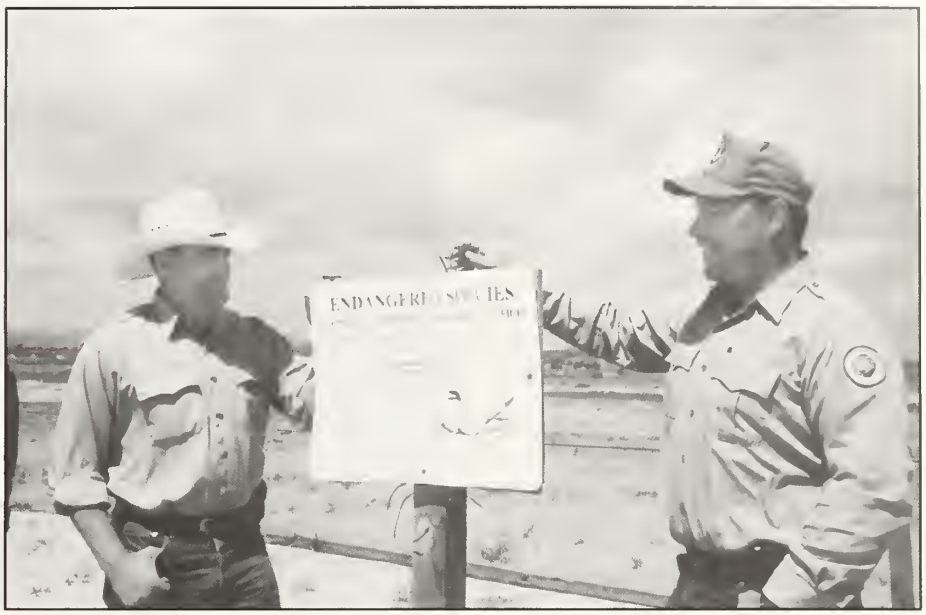
In the Hawaiian islands, WS helps protect natural resources, including many T&E plants and animals, from damage caused by introduced animal populations, such as mongooses and rats. With WS' assistance,



populations of 14 T&E species have been maintained or increased. WS worked with other Federal agencies in FY 2000 to protect four species of water birds and the State bird, the Hawaiian goose, on seven national wildlife refuges and one military wetland area. WS also continued to control mongooses, feral dogs, cats, goats, sheep, pigs, and cattle that threaten the survival of T&E plants, tree snails, and forest birds.

In addition to direct protection of T&E species, WS plays an important role in the recovery efforts of certain T&E species that periodically cause damage to crops, livestock, and private property. For example, program specialists assist with the capture and relocation of depredating grizzly bears in Montana and Louisiana black bears in Louisiana and Mississippi and gray wolves in Montana, Idaho, Wyoming, Minnesota, and Wisconsin. When WS resolves conflicts caused by T&E species, landowners and producers are more likely to tolerate their presence.

In California, WS personnel assisted other Federal and State government agencies with protecting the recently listed endangered Sierra Nevada bighorn sheep. WS efforts consisted of monitoring bighorn sheep and mountain lion movements and removing mountain lions from the close proximity of known herds of bighorn sheep.



Protection of Other Natural Resources

WS is conducting a program for eradicating feral cats from a strategic military atoll in the Indian Ocean. Feral cats have decimated native bird populations on the atoll, and the aid of WS has been enlisted to remove the unwanted predators so native wildlife populations can be enhanced. Work on the island may expand in the future to include removing rats.

WS also cooperated with a private organization and a research center in a study to determine badger predation impacts on nesting waterfowl.

PROTECTION OF PROPERTY

Wildlife sometimes causes damage to public and private property, including buildings, landscaping, roads, utilities, industrial structures, water management facilities, and forest resources. These damages can be relatively minor or may be severe enough to result in significant economic losses or threats to public health or safety.

Throughout their North American range, beaver are responsible for tens of millions of dollars' worth of damage annually to public roads and highways, agricultural and forest resources, soil and water conservation districts, municipal water treatment and sewer systems, and other property. In the Southeastern United States alone, researchers estimate the economic damage caused by beaver to have exceeded $4 billion over a 40-year period.

With the dramatic increase in beaver populations in recent decades and the low demand for fur and other beaver products, it is not surprising that the requests for WS assistance in managing beaver damage have significantly increased. In Oklahoma, for example, the number of requests for WS assistance in handling beaver damage has increased almost 300 percent since 1985. Although WS received slightly fewer beaver damage complaints in Oklahoma during FY 2000, the financial losses reported were greater than in 1999. Since 1993, the number of beaver damage-management projects completed by North Carolina's WS program rose from fewer than 200 annually to more than 1,500 in FY 2000.

Traditionally, WS has recorded reported information on the damage caused by beaver to various resources without taking into account the value of work by the program in preventing further damage. In FY 2000, 15 WS State programs provided estimates for resources saved which included roads, bridges, timber, and other natural resources.

For its GPRA performance assessment, WS set a $20 million target for this work area. The information collected on resources saved during FY 2000 indicates that $27 million in resource losses was averted by WS beaver damage-management projects. Based on this conservative estimate and WS expenditures for beaver work in 12 Eastern States, the benefit–cost ratio is 6.33:1, or for every $1 spent to reduce further beaver damage, $6.33 was saved.

An example of expanding demand for WS beaver-damage assistance and resources saved is the North Carolina program, where WS personnel prevented the impending loss of an estimated $8.5 million in beaver-caused damage to forest and agricultural resources, roads, bridges, airport runways, homes, and other property such as sewer and water treatment systems, dams, and ditches. Resources saved in North Carolina in FY 2000 through WS beaver-damage management increased by almost 243 percent over 1999.

PROTECTION OF HUMAN HEALTH AND SAFETY

WS protects the U.S. public and visitors from threats to human health and safety arising from wildlife-borne diseases, wildlife collisions with aircraft and automobiles, and other hazards caused by wildlife.

For example, WS worked closely in FY 2000 with Federal and State agencies and local governments in addressing increasing public health and safety problems caused by resident Canada geese. With a population approaching 3 million and increasing exponentially, resident Canada geese are a primary concern of Eastern and Central States. In many Eastern States, resident Canada geese lead all other species in complaints by citizens. Problems include threats to air traffic safety at civil airports and military airbases and fecal contamination of municipal water supplies and recreational beaches. With assistance from WS, Canada goose management plans were drafted for two of the four major North American waterfowl flyways, the Atlantic and Mississippi flyways. In addition, WS is a cooperator in the development of an environmental impact statement for the management of resident of Canada geese in the United States. Also in FY 2000, a team of WS biologists developed standard operating procedures for the capture, handling, and transportation of Canada geese. The procedures will be implemented by WS operational programs in FY 2001 pending a review by The Humane Society of the United States, the International Association of Fish and Wildlife Agencies, and APHIS' Animal Care program.

Increasing conflicts between deer populations and expanding suburban development have resulted in increased requests for WS assistance from State wildlife agencies, residential communities, airports, businesses, and individual property owners. In many suburban areas across the country, expanding deer herds and human populations are resulting in automobile–deer collisions, safety hazards at airports, and concerns over the transmission of Lyme disease to people. WS developed an urban white-tailed deer management manual to provide guidance to WS personnel on planning and implementing localized deer hazard management programs. WS deer population reduction efforts at facilities and in a number of communities in Illinois and Georgia resulted in the donation of 31,000 pounds of venison to charitable organizations.

Although mountain lions rarely attack people, the frequency of lion–human conflicts is growing in many Western States. In Oregon, for example, WS addressed 52 incidents involving mountain lions in 1992. In FY 2000, that number rose to 386, of which 118 involved threats to human safety. In one instance, a lion attacked and killed a large dog in a homeowner's backyard soon after a 4-year-old girl playing in the yard returned to the house. WS tracked and removed two large male lions that had been in the yard. More mountain lions are appearing in urban and suburban areas in California, Washington, Nevada, Wyoming, and other Western States and are creating potentially dangerous conditions for people in some locations. WS specialists are recognized for their expertise in resolving mountain lion conflicts, and in Oregon, WS personnel participated in providing cougar and bear attack training for State and other agency natural resource employees.

Disease Surveillance and Control

WS serves a crucial role in the area of disease surveillance. Wildlife-borne diseases spread by birds and mammals through direct and indirect contact pose a threat to humans, pets, and domestic livestock. To protect human interests, WS personnel provided both direct and technical assistance in FY 2000 to suppress wildlife-borne diseases including rabies, plague, Lyme disease, histoplasmosis, and bovine tuberculosis.

Rabies in raccoons has spread up the East Coast and continues to threaten further movement northward into Canada and westward into the Midwest. As a consequence of the continued spread of rabies in wildlife reservoirs, there are growing social and financial costs as unique strains of rabies spread over broader geographic regions of the United States.

In response to the growing concerns associated with wildlife rabies, WS formed a Wildlife Rabies Management Team in 1998 to help coordinate cooperative oral rabies vaccination (ORV) programs in Ohio, New York, Texas, and Vermont (States for which the program has received funding). Participation in the Wildlife Rabies Management Team has grown each year since 1998 in response to interest, funding, and the ability of the team to function effectively as a coalition with mutual interests in research, education, coordination, monitoring, and surveillance to assure sound rabies control.

In FY 2000, WS received an appropriation of $1.5 million, which allowed the program to continue to cooperate for the third consecutive year in ORV projects in Texas, Ohio, New York, and Vermont. These projects also included international cooperation with Mexico and Canada. In addition to providing critically needed funding for air services and baits in some States, WS conducted the necessary wildlife sample collections to allow cooperators to evaluate ORV progress in controlling rabies.

FY 2000 represented the first year since ORV began in south Texas that there were no reported cases of canine rabies in coyotes, down from a high of 166 cases in 1994 before the project began. As a result of this success, a narrower maintenance vaccination barrier will be created along the Rio Grande in 2001 to prevent reinfection from Mexico while other long-term control strategies are evaluated. WS also assisted Texas in containing the spread of gray fox rabies through a vaccination barrier established to prevent movement of this unique strain into population centers, where citizens would be at increased risk of exposure. Because of reduced State funding for this project, WS will likely assume a greater role in providing resource support to help assure better long-term success of the project. In FY 2000, WS assisted in the distribution of more than 2 million oral rabies vaccine baits over a 33,000-square-mile area in southern and west-central Texas to protect citizens and domestic animals from strains of rabies in coyotes and gray foxes.

In FY 2001, WS will assist in the distribution of almost 2 million oral rabies vaccine baits over more than 6,500 square miles of Ohio, New York, and Vermont. This program is designed to prevent the westward and northern spread of raccoon rabies into uninfected areas of the Midwest and Canada. Certain Canadian provinces are important cooperators and contribute significant financial resources to these projects. Monitoring and surveillance by WS and other cooperators indicates these projects show good promise for containing raccoon rabies. Planning has begun to extend the current vaccination zone in Ohio into strategic areas in West Virginia to assure that the current Ohio vaccination barrier is not compromised.

Several WS personnel participated in the 10th Annual Rabies in the Americas Conference in San Diego in FY 2000. This is an internationally acclaimed conference that rotates among the United States, Canada, and Latin America on a 3-year cycle for the dissemination of contemporary information on the various elements of rabies control. WS personnel authored or coauthored seven conference scientific presentations. Abstracts were published in the conference proceedings. Presentation topics ranged from economic analysis of rabies control to characterization of bat conflict issues in the United States.

West Nile Virus—West Nile virus (WNV), a disease with enormous potential to negatively affect human health, livestock, and wildlife, was first documented in the United States late in the late summer of 1999. The disease spread quickly and was responsible for the deaths of 7 of 61 people and 9 of 23 horses diagnosed with WNV in the New York City area in 1999. One of 19 people and 23 of 57 horses diagnosed with WNV died from May through December 2000. The virus also infected a variety of captive birds at the Bronx Zoo and thousands of wild crows along the east coast. Birds serve as the natural host for WNV, which is transmitted to humans and other animals through mosquito bites.

APHIS contingency funds totaling $245,000 allowed WS to participate in a collaborative effort to conduct surveillance for WNV in wild bird populations along the Atlantic coast to determine which species were infected and if the virus could be carried to other States through southerly fall migrations. This information assists local health and agriculture agencies in preparing for and responding to WNV outbreaks. Blood samples collected by WS from crows, house sparrows, and feral pigeons in Wisconsin, New York, Illinois, Missouri, Connecticut, New Hampshire, Vermont, New Jersey, Maryland, Virginia, North Carolina, Georgia, Alabama, and Florida were provided to the National Wildlife Health Center and some State health laboratories for testing. Live crows were captured in Wisconsin and provided to the National Wildlife Health Center for use in laboratory trials. WS participation in surveillance activities will continue into FY 2001.

Other disease surveillance work conducted by WS in FY 2000 included the collection of blood samples from predators for bubonic plague titer monitoring by State health departments and hantavirus monitoring in several Western States.

Airport Safety

Birds and other wildlife that strike aircraft are a serious problem and could cause the catastrophic loss of a major jetliner at many airports in the United States. Wildlife strikes cost U.S. civil aviation more than $300 million annually and pose a serious safety hazard to flight crews and passengers. Impacts to military flight operations are also high. Aircraft lost and damaged by wildlife strikes costs the U.S. Air Force alone an average of $33.67 million annually.

WS plays a key role in reducing public safety risks and property damage associated with wildlife striking aircraft and cooperates with Federal agencies and airport managers across the country to make airports safer. The demand for WS assistance to reduce wildlife hazards in airport environments continues to increase as the number of reported strikes has increased more than threefold from 1990 to 2000. More than 5,700 reported wildlife strikes were recorded for FY 2000 in the FAA National Wildlife Strike Database, which is managed by WS. In addition, on average, 3,000 wildlife strikes are reported each year by the U.S. Air Force.

During 2000, cooperative funding was provided to WS by Federal agencies, airports, counties, municipalities, and waste-handling facilities to conduct direct assistance activities at civil and military airports. WS saw a significant expansion of its airports activities between 1999 and 2000. Technical assistance provided by WS to airport managers and military airbase commanders in 2000 included 181 initial consultations and the development of 100 wildlife hazard assessments, 32 wildlife hazard-management plans, and 4 environmental assessments. WS provided direct hazard-management assistance to 148 airports and technical assistance to 388 airports and military air bases in 48 States, Guam, and Puerto Rico. This represents an increase of 15 percent in 1 year with no appreciable increase in Federal dollars to support airport services. Using a series of different measures, WS

airport biologists estimate that they reduced the risk of aircraft striking wildlife by 70 percent for more than half of the airport projects where the results could be calculated. WS also provided training to 517 airport personnel in recognizing and managing wildlife hazards to air traffic safety.

Wildlife hazards to aircraft landing and departing from a military airbase in Virginia increased to the point that in May 1999, the base funded a full-time WS wildlife biologist to conduct a wildlife hazard assessment and develop a wildlife hazard-management plan. Fighter aircraft damage from gull strikes alone had increased by almost $1 million in 1998, the year prior to WS' presence at the base. Takeoffs and landings were also being aborted or canceled because of deer on or near the runway. WS has completed the hazard assessment, and the management plan is in the approval process. Since October 2000, when WS direct management assistance began, no bird strikes have occurred at the base, and the threat of deer strikes has decreased by 85 percent.

Also in FY 2000, WS submitted an airport hazard reduction funding initiative for FY 2002 for conducting site visits to evaluate wildlife hazard conditions at airports in the Eastern States. This initiative is intended to be included in the President's budget request to Congress. A nationwide funding request for the FY 2003 budget is currently being developed. Funding through these initiatives would allow WS to provide wildlife hazard evaluation services to many airports not currently receiving assistance.

Customer Service and Program Evaluation

WS is a customer-driven program. Because the program is cooperative in nature with clients paying for direct management assistance services, it has always been part of the WS culture to focus on customer satisfaction. WS has conducted several customer satisfaction surveys in the past, including one of direct management assistance and one of technical assistance customers. For both sets of customers, satisfaction ratings ranged between 87 percent and 97 percent. In 1999, WS commissioned NASS to survey U.S. livestock producers served by WS in 24 States. More than 89 percent of the survey respondents were satisfied with direct assistance received from WS. Slightly more than 85 percent said that WS direct management assistance had been effective.

WS conducts periodic reviews of its State programs to improve customer service. Program review teams conduct yearly evaluations of individual State programs with regard to program operation, service delivery, customer satisfaction, procurement, and relationships with key cooperators, including State and other Federal agencies. During FY 2000, program evaluations were conducted for the WS programs in California, Wyoming, Missouri, New Jersey, and Pennsylvania. These evaluations help to increase proficiency and maintain a high level of customer service throughout the national program.

In June, 2000, the USDA Office of Inspector General (OIG) initiated an audit survey of WS employee safety practices and accountability and internal controls over hazardous materials handling, storage, security, and disposal. OIG established a temporary field office at the WS Operational Support Staff (OSS) office in Riverdale, MD, and extensively reviewed employee safety and hazardous materials programs. The survey will continue into next fiscal year with OIG visits to WS regional and field offices.

AWARDS AND PUBLIC RECOGNITION

Secretary's Honor Award

NWRC Director Richard Curnow was a recipient of the USDA 2000 Secretary's Honor Award for Outstanding Customer Service. He has been cited "for leadership in constructing new research facilities, focusing research on wildlife management solutions, and addressing information needs of stakeholders and the public." The Secretary's Honor Award is a prestigious distinction for USDA employees. Past NWRC recipients include the International Programs Unit, the BTS research team, Richard Dolbeer, and Phyllis Harris.

Deputy Administrator's Strategic Management Award

Louisiana State Director Dwight LeBlanc and the Louisiana WS program received the 2000 Deputy Administrator's Strategic Management Award for outstanding achievement in strategic program planning and administration. A clear plan to deliver wildlife damage management in Louisiana was developed and implemented in FY 2000, and an excellent working relationship with the Louisiana program Memorandum of Understanding participating agencies was attained.

Outstanding Service

Betsy Marshall, program support assistant at the NWRC Sandusky field station, received the WS Administrative Employee of the Year award at APHIS headquarters in Riverdale, MD, on July 19, 2000. The award was presented for Marshall's critical contribution in financial and administrative management and for the extra effort she has displayed in activities, such as Bird Strike Committee–USA, which have promoted WS programs to reduce wildlife hazards at airports nationwide.

Dick Winters Award

Bill Paul, Assistant State Director for the Minnesota WS program, was presented with the Dick Winters Award for 2000. This award is given annually by the Eastern Region to recognize professional excellence. Under Bill Paul's leadership, the WS program in Minnesota became a model for developing wolf damage management programs in the United States and around the world.

Wildlife Specialist of the Year

Utah WS wildlife specialist Russell Kayo Wright was presented with the Wildlife Specialist of the Year award by one of Utah's livestock associations. Wright was recognized for his outstanding contributions to livestock protection in Utah.

Special Achievement

The Idaho WS program was presented a special achievement award at the 12th Annual North American Interagency Wolf Conference 2000 held at Chico Hot Springs, MT. The award is in recognition of the professionalism demonstrated by Idaho's employees in managing wolf–human conflicts in the northern Rocky Mountains and exemplary cooperation with other agencies and organizations dedicated to the recovery of the gray wolf.

Research Excellence

A national research award went jointly to Michael Jaeger from NWRC and Dale McCullough of the University of California at Berkeley for a series of studies on predator–livestock relationships. This annual award provides recognition based on recommendations of wildlife professionals throughout the United States. Two other NWRC scientists, Larry Clark and Richard Dolbeer, have received this award since its inception in 1994.